

REMARKS

In response to the Official Action mailed on January 12, 2011, the application has been amended. No new matter has been added. Reconsideration of the rejections of the claims is respectfully requested in view of the above amendments and the following remarks.

Examiner Patel and Examiner Ward are thanked for holding an interview on March 3, 2011 to discuss the present application. At the interview, the differences between claim 11 and the art of record was discussed.

On page 3 of the Official Action, claims 11 - 14 were rejected under 35 USC 103(a) as unpatentable over JP 08-125327-A (referred to below as Takahashi) in view of Kondo (U.S. Patent No. 4,938,410) and Mizoguchi et al (U.S. Patent No. 5,567,151, referred to below as Mizoguchi). This rejection is respectfully traversed.

Claim 11 has been amended to more clearly describe the geometry of the components of this claim. For example, rather than referring to "an upper end", amended claim 11 now refers to a first end and a second end so that the description of the structure is independent of the orientation of the heater in space. Claim 11 has also been amended to include the feature of previous claim 14 concerning the area of an inlet (referred to in

claim 14 as a suction opening). Claim 11 now describes a heater having partitions which separate a suction chamber from discharge chambers and which slope towards each other so that the flow area of the suction chamber decreases towards an inlet. Amended claim 11 is supported by Figures 3 and 4 of the drawings as filed. The cited references do not disclose or suggest such an arrangement.

Takahashi discloses a reflow furnace having a plurality of box-shaped heaters 1. Each heater 1 has two partitions 2 with a suction port 3 between the partitions 2 and discharge ports 4 disposed on opposite sides of the suction port 3 and separated from the suction port 2 by the partitions 2. A fan 6 is disposed between the partitions 2, and heaters 7 are disposed on opposite sides of the fan 6 and are separated from the fan 6 by the partitions 2. The partitions 2 extend parallel to each other and do not slope towards each other. Therefore, the flow area of a suction chamber does not decrease towards an inlet of the suction chamber as set forth in claim 11.

Kondo discloses a reflow soldering apparatus having preheating chambers 8, 9 and a reflow chamber 10 disposed above and below a belt conveyor 5. Taking the preheating chamber 8 shown in Figures 2 and 3 of Kondo as an example of the structure of each of chambers 8 - 10, a plurality of heaters 11a are disposed at outlet portions of the chamber 8. Adjoining heaters 11a are separated from each other by partition plates 12a for maintaining temperature differentials between adjoining spaces.

A ventilating fan 13a draws air into the chamber 8 through flow passages 14 formed between an outer wall 8a and an inner wall 8b. The air is then passed over the heaters 11a by the ventilating fan 13a and blown at printed circuit boards 1 transported by the belt conveyor 5. The inner walls 8b and the outer walls 8a remain parallel to each other, as a result of which the flow area of a flow passage 14 remains substantially constant over its length. There are no partitions which slope towards each other so that the flow area of a suction chamber decreases towards an inlet of a suction chamber as set forth in claim 11.

Mizoguchi discloses a reflow furnace with heaters having a blowing outlet 7 equipped with a cover comprising a multiporous metal plate 15 having two rows of holes 17 formed therein. The holes 17 decrease in diameter towards the widthwise center of the plate 15, with no holes 17 being formed at the widthwise center. According to column 5, lines 14 - 18 of Mizoguchi, the plate 15 causes hot gas to be discharged weakly through the pores in the plate 15 and strongly through the discharge holes 17. According to column 5, lines 1 - 9 of Mizoguchi, the reason for having a stronger discharge of hot gas at the widthwise ends of the plate 15 than at the center is to increase the temperature at the widthwise ends of a printed circuit board where there is a cooling effect due to unillustrated grippers.

According to page 4 of the Official Action, it would have been obvious from Kondo to provide sloping partitions in the

heater of Takahashi "since such is an art-recognized alternative of providing partitions in a reflow heater". As the Applicants understand it, the position of the Official Action is that the sloping partition plates 12a in Kondo would suggest to a person skilled in the art to make the partitions 2 of Takahashi into sloping partitions.

According to page 5 of the Official Action, it would further have been obvious from Mizoguchi "to modify the slanted plates of Takahashi so as to provide a discharge plate similar to Mizoguchi in order to provide uniform heating of the substrate". It is assumed that by "slanted plates", the Official Action is referring to the louvers 8 which are disposed at the discharge ports 4 of the heater of Takahashi, and that "to modify the slanted plates" means to provide some sort of plates corresponding to the multiporous metal plates 15 of Mizoguchi in the vicinity of the louvers 8.

As set forth in the amendment filed on September 23, 2010 and as explained at the interview held on March 2, 2011, the cited references cannot reasonably be combined in a manner which would result in the arrangement set forth in claim 11.

It is true that the partition plates 12a of Kondo slope towards each other. However, the partition plates 12a of Kondo perform a totally different function from the partitions 2 of Takahashi and are thus not analogous to the partitions 2 of

Takashi. Therefore, the fact that the partition plates 12a of Kondo are sloping does not suggest imparting a slope to the partitions 2 of Takahashi.

The partitions 2 of Takahashi separate a suction port 3 from two discharge ports 4. Gas flowing on one side of each partition 2 is suction gas, and gas flowing on the opposite side of each partition 2 is discharge gas. As such, the partitions 2 serve to separate suction gas from discharge gas.

In contrast, the partition plates 12a of chamber 8 of Kondo are disposed in a discharge space communicating with the outlets of the chamber 8. The partition plates 12a act to create regions of different temperatures, but the gas flowing on either side of any of the partition plates 12a is discharge gas. Namely, the partition plates 12a do not separate suction gas from discharge gas. As such, the partition plates 12a of Kondo more akin to the louvers 8 of Takahashi than to the partitions 2 of Takahashi. Since the partition plates 12 of Kondo perform totally different functions from the partitions 2 of Takahashi, the mere fact that partition plates 12a of Kondo slope so as to converge can in no way suggest that the partitions 2 of Takahashi should slope with respect to each other.

In addition, as set forth in the previous response, the direction in which the partition plates 12a of Kondo slope is not the same as the direction of slope of the partitions in claim 11.

The partition plates 12a of Kondo converge towards the upstream end of a discharge space of chamber 8, i.e., away from the outlets of chamber 8. Similarly, where the inner walls 8b and the outer walls 8a of the chamber 8 of Kondo converge, they converge towards the end of the chamber 8 remote from inlets and outlets of the chamber 8. The same applies to the embodiment of Figure 1 of Kondo, in which outer walls 8a and screen plates 26a converge towards the end of chamber 8 which is remote from inlets and outlets of the chamber 8.

Therefore, as set forth previously, if a person skilled in the art were to conclude anything from Kondo about whether plates or partitions should slope, he would have to conclude that they should slope so as to converge towards the end of a chamber remote from inlets and outlets of the chamber 8. Accordingly, if Takahashi were to be modified so that the partitions 2 of Takahashi sloped so as to converge, they would have to slope so as to converge towards the end of the heater 1 of Takahashi which is remote from the inlets and outlets.

This is the opposite of the arrangement set forth in claim 11, which states that partitions slope towards each other so that the flow area of a suction chamber decreases towards an inlet.

As stated above, Mizoguchi appears to have been relied upon as teaching the concept of a perforated plate. This reference teaches nothing about the concept of sloping partitions as set

forth in claim 11 and so does not make up for the shortcomings in the teachings of the other references.

Accordingly, as a person skilled in the art could not find a reason to modify Takahashi in the manner proposed by the Official Action to impart a slope to the partitions 2, the Official Action fails to set forth a *prima facie* case of obviousness. Furthermore, since imparting a slope to the partitions 2 of Takahashi like the slope imparted to the partition plates 12a of Kondo would result in the partitions 2 of Takahashi sloping in the opposite direction from the partitions of claim 11, and since Mizoguchi teaches nothing about partitions, the cited references cannot be combined in a manner which would result in an arrangement having all the features of claim 11 and therefore cannot render this claim obvious. Claim 11 and claims 12 and 13 which depend from it are thus allowable. The features of claim 14 have been incorporated into claim 11, so claim 11 has been cancelled as redundant.

Claims 7 - 10 and 15 which were withdrawn from consideration have been cancelled. Claims 16 - 18, which were withdrawn from consideration in the most recent Official Action as being directed to a non-elected invention, have been amended so as to depend from claim 11 and so are now drawn to an elected invention. Therefore, these claims are allowable as depending from claim 11.

New claims 19 - 23 describe additional features of the present invention. These claims are allowable as depending from claim 11.

In light of the foregoing remarks, it is believed that the present application is in condition for allowance. Favorable consideration is respectfully requested.

Respectfully submitted,



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